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ABSTRACT

A self-assessment inventory of teaching competencies was devised for use by student teachers. The instrument was administered to 15 seniors prior to a methods course and student teaching and again after student teaching. Factor analysis of the pre- and posttest scores revealed five dimensions accounting for 77 and 68 percent of the variance, respectively. Differences in mean scores were found ($p<.01$) in favor of increased self-assessment. The instrument was then administered to 34 experienced high school mathematics teachers. It was found that the post-student teacher scores differed from the experienced teacher scores in only one perceived self-assessment. It is suggested that the change in scores from pre- to post-student teaching could be due to training, or more insightful assessment of abilities, or a combination of these and other factors. (JG)

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MATHEMATICS STUDENT TEACHERS' SELF-ASSESSMENT OF TEACHING COMPETENCIES*

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MATHEMATICS STUDENT TEACHERS' SELF-ASSESSMENT OF TEACHING COMPETENCIES

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Abstract

A self-assessment inventory of teaching competencies was devised for use by mathematics students enrolled in methods and student teaching courses. On the basis of suggestions from experienced teachers and doctoral students in mathematics education, an inventory of 50 items was compiled. A class of seniors in teacher education (N = 15) assessed their competence in each of the skills prior to taking their methods course and student teaching, and at the end of the training experience. Subjects also rated the skills as to their importance to effective teaching. Factor analyses of pre- and postability scores revealed five dimensions accounting for 77 and 68 percent of the variance, respectively. Scales were identified and differences in mean scores were found ($p<.01$) in favor of increased self-assessment. For comparison, the inventory was administered to 34 experienced, well-qualified teachers of mathematics in a large high school district in suburban Chicago. Differences between mean ability scores revealed that although the student teachers rated themselves lower ($p<.01$) than the experienced teachers prior to training, at the end of the semester, only one difference in perceived self-assessment remained. Few differences in importance ratings were found in any of the comparisons.

Introduction

The purpose of this exploratory study was to initiate the development of an inventory of teaching competencies for mathematics students who are enrolled in teaching methods or student teaching courses. Such a list of competencies might be used by students as a guide to assessing their strengths and weaknesses as they prepare to assume teaching responsibilities. The inventory might also be of use to methods instructors and student teaching supervisors as they devise appropriate activities for their teachers in training. Furthermore, such an instrument might provide useful data in the evaluation of methods or student teaching courses. And at the in-service level, the device might serve to assess professional growth of teachers.

Of all the courses in the teacher preparatory sequence, those relating to teaching methods commonly are the least favored by students and practicing professionals alike. It often is charged that there is little relationship between the content of the methods courses and those techniques which are most needed by beginning teachers.

In this study there was a systematic attempt to identify those competencies which are judged by experienced mathematics teachers to be of significance. Once identified, such skills were classified and comparative data obtained from beginners and experienced personnel. Presumably, such empirical evidence would provide useful information to both student teachers and instructors.

Procedure

The identification of competencies for effective teaching was done with the assistance of doctoral students in a mathematics teacher education seminar. The resulting list was subjected to further screening by consulting teachers from the public schools who were involved in the University's Training of Teachers of Teachers (TTT) program.

The present exploratory version of the scale asks respondents to rate, anonymously on a five-point scale, their own competence in performing each of 50 activities. Then, on a second scale, they are asked to assess the perceived importance of each of the activities. This information was sought for two reasons: (1) As a guide to methods instruction. Such ratings are presumably an index of perceived competence, and might be used by instructors as they plan areas of emphasis in their methods courses. (2) As a source of information concerning what student teachers perceive as being important. It was conjectured that students without prior teaching experience have little information on which to make sound judgments as to the importance of certain pedagogical skills.

In the spring of 1970, the scale was administered to a class of 23 student teachers at the beginning of the "professional semester" (prior to methods instruction and student teaching) and at the end of the semester. Because of missing data, the final sample size was reduced to 15. To provide a source of comparative data, 34 experienced teachers of mathematics, some of whom were supervising teachers for the student teachers, completed the scale in the fall of 1970.

Description of sample

Student teachers. These were seniors in teacher education, all of whom had completed, or were within a few hours of completing a major of 37 hours in mathematics. Few courses in education, however, other than a two-hour introductory course in the sophomore year, and a two-hour course in the history and philosophy of education, had been taken prior to the professional semester. In no case had a student prior experience in either a methods course or student teaching.

Experienced teachers. The sample of 34 teachers of mathematics was drawn from the mathematics faculty of a high school district comprising six large schools in the northwest Chicago suburbs. By conventional standards the teachers in the district are well qualified: over 60 percent have master's degrees, and the median experience is approximately seven years.

Analyses

Principal components factor analyses were performed on the ability data in an attempt to identify dimensions of competence sampled by the instrument.

Five factors for each set of data were found to account for 77 and 68 percent of the variance in the pre- and postdata, respectively. Rotation to simple structure and examination of items with loadings led to the following names for the factors: General Pedagogy, Mathematics Pedagogy, Managerial, Professional Awareness and Computer Technology. Differences between mean scale scores were then examined.

Results

Factor analyses of the student teachers' self-ratings of abilities on each set of data yielded five factors as reported in Table I.

Table I.--Factor Analyses of Student Teacher Ability Self-Ratings

Factor	Eigenvalues		Cumulative percent of variance	
	Pretest	Posttest	Pretest	Posttest
I	18.86	11.02	37.72	22.04
II	7.25	6.79	52.22	35.62
III	5.15	6.37	62.53	48.37
IV	4.18	5.32	70.89	59.02
V	3.08	4.47	77.05	67.97

Interpretation of the factors was done on the basis of the classification of items exhibited in Table II. Items are ranked there on the basis of mean loadings for the pre- and postability analyses. Asterisks indicate loadings which are highest on that particular factor. Unmarked loadings are second highest for that factor, and loadings in parentheses are neither highest nor second highest. In no case did the mean factor loading fall below .22 and in most cases, mean loadings were well above .35.

Ability Ratings
(See Tables III and IV.)

Aside from the fact that the students tended to rate themselves lower on the Professional Awareness scale than on the others, the most interesting result arising from a comparison of scale means before and after the teaching experience is that on each scale the students rated their ability higher after the experience. ($p<.01$). This could be attributed to the learning inherent in the experience or to a reassessment of their abilities. For example, one might hypothesize the change is attributable to the fact that the students saw themselves in a new light after their teaching rather than their having improved in some of the indicated competencies.

In any case it is interesting that before the teaching experience the students rated their ability on the first four scales lower than did the experienced teachers ($p<.01$), although after the experience they tended to rate themselves nearly the same (no significant difference in means, see Table IV). Computer technology is the one scale where this trend differed. Prior to teaching, the students rated their ability in a manner similar to that of the experienced teachers and <u>after</u> their experience they rated themselves more highly ($p<.01$).

Importance Ratings
(See Tables V and VI.)

Comparisons of scale means for the importance ratings indicated that there seemed to be considerable agreement as to the importance of the scale items among the pre- and poststudent teachers, and the experienced teachers. No significant differences between the scale means for any of the groups were found. Apparently, the student teachers and experienced teachers tended to agree on the importance of the various dimensions of teaching competencies. (Again, except for computer technology.)

Correlations between the ability and importance ratings of the individual scales were generally low. (See Table VII.) The only point of interest was that the experienced teachers showed negative correlations for all scales. This suggests a tendency to rate items high in ability also high in importance and vice versa for this sample.

Table II.--Factor Loadings on Ability Items for Student Teachers**
(Roman Numerals Indicate Order of Factors in Analyses.)

A. General Pedagogy

Number	Factor loading (II) Pre	(I) Post	Item
1	*.77	*.94	Distinguish between an angle and its measure.
38	*.89	*.61	Use an alternative, simpler approach to explaining a concept when the present approach has failed.
18	*.75	*.59	Explain the concept of a variable to a junior high school student in terms which he is likely to understand.
42	*.91	.44	Determine letter grades for my students' work while I have been teaching them.
7	*.69	*.63	Explain to a confused student the difference between an angle and its measure.
22	.61	*.71	Use a variety of techniques in calling the attention of my class to the topic at hand.
23	.50	*.80	Get up before my fellow student teachers and teach a lesson.
47	.59	*.68	Locate materials for a mathematics bulletin board display.
6	*.63	*.60	Distinguish between a number and a numeral.
48	*.70	(.41)	Give students assistance in improving their study habits.
12	(.14)	*.94	Use an overhead projector as a tool for discussing homework.
14	(.14)	*.94	Use overhead projector transparencies in introducing the concept of congruence.
37	.42	*.64	Construct a test which will diagnose the weaknesses of my class.
17	.42	*.53	Give an example of a modus ponens pattern of inference in tenth-grade geometry proofs.
46	(.36)	*.58	Conduct a conference with an irate parent of one of my failing students.
24	*.77	(.11)	Get up before the students in my school and teach a lesson.
20	(.26)	.37	Outline what topics are covered in the freshman algebra course in my school.
39	*.70	(-.07)	Determine when my present approach of explaining a concept has failed.

Table II (Cont.)

B. Mathematical Pedagogy

Number	Factor loading (V) Pre	(V) Post	Item
2	.33	*.76	Demonstrate a congruence proof for triangles.
34	(.29)	*.66	Demonstrate three different approaches to the same congruence proof.
43	(-.04)	*.94	Demonstrate a procedure for finding square root that emphasizes understanding rather than following rules.
44	*.58	(.33)	Give an example of a generalization over the real numbers.
41	*.53	(.29)	Use a Flanders Interaction Analysis scheme to determine whether my class is teacher dominated.
49	.58	.25	Devise a laboratory activity for introducing factoring of algebraic expressions.
50	(-.16)	*.84	Plan a lesson for a general mathematics class which involves the use of a desk calculator.
4	(.19)	(.24)	Use paper-folding activities to suggest a formula for determining the area of a triangle.

C. Managerial

Number	Factor loading (I) Pre	(II) Post	Item
8	*.63	*.83	Operate a 16mm sound movie projector.
3	*.73	*.65	Take up in three different ways previously assigned homework.
10	*.87	.39	Draw a sketch on an overhead projector transparency.
9	(.30)	*.84	Operate a tape recorder, both for recording and playback.
13	*.71	.41	Operate a ditto machine.
5	*.83	(.09)	Reserve a film or filmstrip for use in your class.
19	(.37)	*.48	Conduct a senior high school lesson on trigonometry using small discussion groups.
25	(.18)	*.63	Deal with a student who makes a smart-aleck remark during my first lesson.
32	(-.05)	*.82	Respond to a student who asks me a question I cannot answer.
26	(.14)	*.59	Deal with a student who is habitually late to my class.
11	*.70	(-.07)	Photographically transfer a student's homework to an overhead projector transparency.
33	(-.18)	*.81	Respond to a student who asks me a question I do not understand.
31	.24	(.20)	Demonstrate an angle bisection technique when I cannot find the blackboard compass.

Table II (Cont.)

D. Professional Awareness

Number	Factor loading (III) Pre	(III) Post	Item
36	*.76	*.81	Identify three standardized tests in high school mathematics.
27	.63	*.62	Identify five professional journals to which I could turn for help during student teaching.
28	*.71	*.49	Identify three professional organizations of mathematics teachers.
29	*.71	.42	Define flexible scheduling in terms of its relevance to teaching.
40	(.22)	*.86	Recognize three strategies being used by my students to "fake out" teachers.
21	.45	.59	Outline the general topics which have been covered in junior high school by the freshmen at my school.
35	.37	(.30)	Outline the topics covered during the first semester of the two-semester geometry course in my school.
45	(.07)	*.58	Teach a generalization using either an expository or an heuristic strategy.

E. Computer Science

Number	Factor loading (IV) Pre	(IV) Post	Item
16	*.85	*.77	Write a FORTRAN program which will suggest whether a series is convergent or diverent.
15	*.85	*.59	Write a FORTRAN program which will list a set of numbers and their sum.
30	.55	*.81	Operate a keypunch machine.

**Scoring key. Scoring instructions to respondents were as follows:

This questionnaire is designed to determine how well you could perform a series of tasks, according to your perceptions of your abilities. Please read each of the following statements and rate your abilities to handle them on a five-point scale as follows:

1. I could easily do this.
2. I would have some difficulty in doing this.
3. I would have considerable difficulty in doing this, but probably could squeak through.
4. I could probably not do this.
5. I would be hopeless for me even to attempt to do this task.

Conclusions

Taking full account of the limitations of this study (e.g., small sample size and lack of refinement of the items) there is indication that several dimensions of teaching competencies can be identified and examined in the manner herein described. It is fair to surmize that the "How Well Could I..." scale, even in this preliminary form, has desirable psychometric properties and holds promise for use in detecting changes in self-assessment of teaching competencies, such as may result from training.

The data here clearly indicate significant increases in student-teacher self-assessment of teaching competencies at the end of the professional semester (comprised of a methods course and student teaching). Such changes could be attributed to training effects of the semester, or to more insightful assessment of abilities, or to a combination of these and other factors. With respect to importance, the evidence suggests that student teachers rate teaching skills in a manner similar to experienced teachers.

Table III.--Ability Scales for Student Teachers

Scale		Pretest	Posttest	$\bar{x}_1 - \bar{x}_2$	S.E.	*t(paired)
General pedagogy (Item N = 18)	$\bar{x}$	2.00	1.37	.63	.15	4.05
	SD	.74	.31			
	rel.	.95	.96			
Mathematics pedagogy (Item N = 8)	$\bar{x}$	2.63	1.59	1.04	.17	6.22
	SD	.75	.38			
	rel.	.72	.78			
Managerial (Item N = 13)	$\bar{x}$	2.03	1.35	.68	.14	4.88
	SD	.63	.32			
	rel.	.87	.86			
Professional awareness (Item N = 8)	$\bar{x}$	3.04	1.98	1.06	.15	6.93
	SD	.80	.56			
	rel.	.93	.76			
Computer technology (Item N = 3)	$\bar{x}$	2.89	1.76	1.13	.22	5.26
	SD	1.15	.51			
	rel.	.83	.85			
Total (Item N = 50)	$\bar{x}$	2.32	1.52	.80	.13	6.37
	SD	.62	.25			
	rel.	.97	.89			

*$P(|t| > 2.98) = .01$, df = 14

Table IV.--Ability Scales for Student Teachers and Teachers

Scale		Teachers ($\bar{x}_3$)	$\bar{x}_1 - \bar{x}_2$	S.E.	*t	$\bar{x}_2 - \bar{x}_3$	S.E.	*t
General pedagogy (Item N = 18)	$\bar{x}$	1.28	.72	.14	5.14	.09	.08	1.24
	SD	.21						
	rel.	.61						
Mathematics pedagogy (Item N = 8)	$\bar{x}$	1.79	.84	.18	4.74	-.20	.14	1.48
	SD	.46						
	rel.	.73						
Managerial (Item N = 13)	$\bar{x}$	1.34	.69	.13	5.39	.02	.09	.19
	SD	.26						
	rel.	.76						
Professional awareness (Item N = 8)	$\bar{x}$	1.82	1.22	.19	6.53	.19	.16	1.04
	SD	.50						
	rel.	.71						
Computer technology (Item N = 3)	$\bar{x}$	2.66	.23	.37	.62	-.90	.33	-2.73
	SD	1.23						
	rel.	.87						
Total (Item N = 50)	$\bar{x}$	1.55	.77	.13	6.13	-.02	.08	-.25
	SD	.27						
	rel.	.87						

Key: $\bar{x}_1$ = Mean for student teachers at beginning of semester (N = 15)

$\bar{x}_2$ = Mean for student teachers at end of semester (N = 15)

$\bar{x}_3$ = Mean for experienced teachers (N = 34)

*$P(|t| > 2.68) = .01$, df = 47

Table V.--Importance Scales for Student Teachers

Scale		Pretest	Posttest	$\bar{x}_2 - \bar{x}_1$	S.E.	*t(paired)
General pedagogy (Item N = 18)	$\bar{x}$	3.69	3.89	.20	.22	.91
	SD	1.27	1.05			
	rel.	.99	.98			
Mathematics pedagogy (Item N = 8)	$\bar{x}$	3.42	3.41	- .01	.13	- .06
	SD	.80	.87			
	rel.	.86	.89			
Managerial (Item N = 13)	$\bar{x}$	3.38	3.54	.16	.19	.87
	SD	.87	1.00			
	rel.	.97	.98			
Professional awareness (Item N = 8)	$\bar{x}$	3.31	3.22	- .09	.17	- .54
	SD	.85	.97			
	rel.	.82	.93			
Computer technology (Item N = 3)	$\bar{x}$	2.58	2.93	.35	.24	1.50
	SD	.71	.88			
	rel.	.93	.96			
Total (Item N = 50)	$\bar{x}$	3.44	3.55	.11	.16	.75
	SD	.92	.91			
	rel.	.99	.99			

*$P(|t| > 2.98) = .01$, df = 14

Table VI.--Importance Scales for Student Teachers and Teachers

Scale		Teachers ($\bar{x}_3$)	$\bar{x}_3 - \bar{x}_1$	S.E.	*t	$\bar{x}_3 - \bar{x}_2$	S.E.	*t
General pedagogy (Item N = 18)	$\bar{x}$	3.92	.23	.27	.85	.03	.24	.13
	SD	.65						
	rel.	.94						
Mathematics pedagogy (Item N = 8)	$\bar{x}$	3.29	- .13	.19	- .68	- .12	.19	- .61
	SD	.49						
	rel.	.57						
Managerial (Item N = 13	$\bar{x}$	3.45	.07	.21	.32	- .09	.22	- .44
	SD	.56						
	rel.	.89						
Professional awareness (Item N = 8)	$\bar{x}$	3.16	- .15	.20	- .75	- .06	.21	- .28
	SD	.52						
	rel.	.59						
Computer technology (Item N = 3)	$\bar{x}$	2.12	- .46	.25	-1.83	- .81	.27	-3.00
	SD	.85						
	rel.	.85						
Total (Item N = 50)	$\bar{x}$	3.47	.03	.19	.15	- .08	.19	- .48
	SD	.44						
	rel.	.94						

Key

$\bar{x}_1$ = Mean for student teachers at beginning of semester (N = 15)

$\bar{x}_2$ = Mean for student teachers at end of semester (N = 15)

$\bar{x}_3$ = Mean for experienced teachers (N = 34)

*P($|t| > 2.68$) = .01, df = 47

Table VII.--Correlations Between Ability and Importance Scales

	Student teachers		
	Pretest	Posttest	Experienced teachers
General pedagogy	.35	.03	-.38*
Mathematics pedagogy	-.02	-.19	-.12
Managerial	.38	.16	-.17
Professional awareness	.25	-.11	-.17
Computer technology	-.40	-.32	-.40*
Total	.28	.08	-.17

*Significant at .05 level.

Appendix A

Item Statistics for Student Teachers and Experienced Teachers

	Ability						Importance					
	Student teachers				Experienced teachers		Student teachers				Experienced teachers	
	Pre		Post				Pre		Post			
Item	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1.	1.53	1.06	1.07	0.26	1.06	0.24	3.75	1.34	4.20	0.77	4.21	0.98
2.	1.47	1.13	1.07	0.26	1.09	0.29	4.06	1.44	3.93	1.33	4.62	0.74
3.	2.21	0.97	1.60	0.63	1.39	0.61	3.80	1.15	3.40	1.12	3.45	1.00
4.	3.40	1.12	2.00	1.07	1.68	0.98	3.13	0.72	3.20	0.86	2.65	0.92
5.	1.87	1.25	1.20	0.41	1.12	0.33	3.19	1.05	3.20	1.15	3.06	0.95
6.	1.60	1.12	1.13	0.35	1.15	0.44	3.81	1.52	4.13	0.92	3.74	1.02
7.	1.80	1.08	1.20	0.41	1.09	0.29	3.81	1.52	4.13	1.25	4.21	1.15
8.	2.73	1.53	1.80	0.77	1.76	0.74	2.56	0.89	3.00	1.00	2.56	1.16
9.	1.53	1.06	1.20	0.41	1.62	0.70	2.75	1.06	2.73	1.16	2.35	1.23
10.	1.67	1.11	1.13	0.35	1.09	0.29	3.25	1.18	3.53	1.13	3.38	0.92
11.	3.47	1.19	1.80	1.08	1.94	1.23	2.63	0.96	3.07	0.96	2.68	0.94
12.	1.93	1.33	1.07	0.26	1.09	0.29	3.50	1.26	3.73	1.22	3.32	0.98
13.	2.33	1.23	1.20	0.77	1.09	0.38	3.63	1.15	3.80	1.37	3.29	1.43
14.	1.93	1.33	1.07	0.26	1.15	0.36	3.56	1.26	3.73	0.96	2.91	0.83
15.	3.00	1.56	1.47	0.64	2.71	1.49	2.75	1.00	3.07	0.96	2.24	0.99
16.	3.67	0.98	2.67	0.82	3.21	1.30	2.63	0.89	3.00	1.00	2.12	1.04
17.	3.08	1.38	1.87	0.74	2.24	1.48	3.15	0.99	3.64	1.01	3.41	1.23
18.	1.60	0.91	1.13	0.35	1.24	0.50	4.13	1.63	4.13	1.41	4.15	1.23
19.	2.07	0.88	1.53	0.74	1.50	0.90	3.63	1.20	3.53	1.13	3.44	1.19
20.	2.33	1.35	1.67	0.82	1.09	0.29	3.50	1.32	3.50	1.29	3.97	0.94
21.	3.00	1.13	2.33	1.23	2.35	0.95	3.25	1.34	3.57	1.34	3.47	0.96
22.	2.07	0.70	1.47	0.64	1.32	0.59	3.75	1.53	3.93	1.39	4.26	0.99
23.	1.80	0.77	1.33	0.62	1.26	0.57	3.38	1.41	3.20	1.47	3.50	1.31
24.	1.73	0.80	1.07	0.26	1.00	0.00	4.13	1.59	4.40	1.40	4.47	1.05
25.	1.73	0.70	1.40	0.63	1.15	0.44	3.88	1.50	4.07	1.44	4.15	1.05
26.	1.87	0.92	1.13	0.35	1.24	0.55	3.75	1.34	3.53	1.30	3.94	1.04
27.	3.40	1.24	1.87	0.83	2.12	1.12	3.19	1.38	2.93	1.10	2.62	0.89
28.	3.40	1.35	1.67	0.72	1.21	0.73	2.75	1.00	2.80	1.08	2.62	0.92
29.	2.87	1.13	1.73	0.96	1.82	0.90	3.13	0.96	3.43	0.85	2.79	0.91
30.	2.00	1.51	1.13	0.35	2.06	1.30	2.63	0.96	2.73	0.80	2.00	1.02
31.	1.67	0.72	1.20	0.41	1.18	0.58	3.44	1.21	3.67	1.18	3.59	1.08
32.	1.53	0.64	1.13	0.35	1.09	0.29	4.00	1.55	4.33	1.40	4.50	0.99
33.	1.73	0.59	1.27	0.46	1.26	0.51	3.94	1.57	4.27	1.39	4.56	0.99
34.	2.60	1.18	1.73	0.59	1.76	0.85	3.38	0.72	3.80	0.86	3.35	1.01
35.	2.80	1.21	2.20	1.01	1.24	0.55	3.81	1.05	3.60	1.18	3.91	0.90
36.	3.67	0.98	2.53	0.99	2.53	1.21	2.94	0.93	3.07	0.80	2.59	1.05
37.	2.67	0.98	1.60	0.63	1.59	0.70	4.13	1.59	4.27	1.39	4.24	1.23
38.	2.20	0.68	1.40	0.51	1.29	0.46	4.25	1.48	4.33	1.40	4.47	1.05
39.	1.67	0.82	1.33	0.49	1.26	0.51	4.31	1.49	4.40	1.40	4.68	0.98
40.	2.13	1.06	1.13	0.35	1.29	0.52	3.50	1.21	3.93	1.32	3.85	0.93
41.	3.33	1.40	1.33	0.49	3.32	1.32	2.80	0.77	2.93	0.70	1.97	1.05
42.	1.87	0.83	1.47	0.52	1.24	0.55	3.38	1.50	3.00	1.32	4.21	1.15
43.	2.53	1.13	1.47	0.64	1.68	0.94	3.75	1.34	3.53	1.30	3.41	0.96
44.	2.13	1.30	1.67	0.62	1.21	0.64	3.50	1.16	3.47	1.06	4.03	0.90
45.	3.07	1.03	2.40	0.74	1.97	1.29	2.60	0.94	3.07	1.07	3.52	1.20
46.	2.40	0.83	2.07	0.70	1.35	0.54	3.63	1.59	4.07	1.33	4.18	1.00
47.	2.07	0.96	1.40	0.63	1.44	0.70	2.56	1.03	2.87	1.25	2.59	0.92
48.	1.87	0.99	1.40	0.51	1.18	0.39	3.75	1.81	3.93	1.33	4.00	1.13
49.	2.73	1.22	2.00	0.93	1.91	0.93	3.44	1.03	3.38	1.10	3.15	0.89
50.	2.80	1.26	1.47	0.64	1.71	0.97	3.19	0.91	3.07	1.16	3.21	1.04

Appendix B

the

How Well Could I....

inventory

TECHNIQUES OF TEACHING SECONDARY SCHOOL MATHEMATICS

HOW WELL COULD I....

This questionnaire is designed to determine how well you could perform a series of tasks, according to your perceptions of your abilities. Please read each of the following statements and rate your abilities to handle them on a five-point scale as follows:

1. I could easily do this.
2. I would have some difficulty in doing this.
3. I would have considerable difficulty in doing this, but probably could squeak through.
4. I could probably not do this.
5. It would be hopeless for me even to attempt to do this task.

Place your answers in the blanks provided in the left margin, under the heading "ability." Note: "My school" refers to the school where you will be teaching.

For the present, disregard the column on the right, labeled "importance."

Ability			Importance
( )	1.	Distinguish between an angle and its measure.	( )
( )	2.	Demonstrate a congruence proof for triangles.	( )
( )	3.	Take up in three different ways previously assigned homework.	( )
( )	4.	Use paper folding activities to suggest a formula for determining the area of a triangle.	( )
( )	5.	Reserve a film or filmstrip for use in your class.	( )
( )	6.	Distinguish between a number and a numeral.	( )
( )	7.	Explain to a confused student the difference between an angle and its measure.	( )
( )	8.	Operate a 16 mm sound movie projector.	( )
( )	9.	Operate a tape recorder, both for recording and playback.	( )
( )	10.	Draw a sketch on an overhead projector transparency.	( )
( )	11.	Photographically transfer a student's homework to an overhead projector transparency.	( )
( )	12.	Use an overhead projector as a tool for discussing homework.	( )
( )	13.	Operate a ditto machine.	( )
( )	14.	Use overhead projector transparencies in introducing the concept of congruence.	( )

Ability			Importance
( )	15.	Write a FORTRAN program which will list a set of numbers and their sum.	( )
( )	16.	Write a FORTRAN program which will suggest whether a series is convergent or divergent.	( )
( )	17.	Give an example of a modus ponens pattern of inference in tenth-grade geometry proofs.	( )
( )	18.	Explain the concept of a variable to a junior high school student, in terms which he is likely to understand.	( )
( )	19.	Conduct a senior high school lesson on trigonometry using small discussion groups.	( )
( )	20.	Outline what topics are covered in the freshman algebra course in my school.	( )
( )	21.	Outline the general topics which have been covered in junior high school by the freshman at my school.	( )
( )	22.	Use a variety of techniques in calling the attention of my class to the topic at hand.	( )
( )	23.	Get up before my fellow student teachers and teach a lesson.	( )
( )	24.	Get up before the students in my school and teach a lesson.	( )
( )	25.	Deal with a student who makes a smart-alec remark during my first lesson.	( )
( )	26.	Deal with a student who is habitually late to my class.	( )
( )	27.	Identify five professional journals to which I could turn for help during student teaching.	( )
( )	28.	Identify three professional organizations of mathematics teachers.	( )
( )	29.	Define flexible scheduling in terms of its relevance to teaching.	( )
( )	30.	Operate a keypunch machine.	( )
( )	31.	Demonstrate an angle bisection technique when I cannot find the blackboard compass.	( )
( )	32.	Respond to a student who asks me a question I cannot answer.	( )

Ability			Importance
( )	33.	Respond to a student who asks me a question I do not understand.	( )
( )	34.	Demonstrate three different approaches to the same congruence proof.	( )
( )	35.	Outline the topics covered during the first semester of the two-semester geometry course in my school.	( )
( )	36.	Identify three standardized tests in high school mathematics.	( )
( )	37.	Construct a test which will diagnose the weaknesses of my class.	( )
( )	38.	Use an alternative, simpler approach to explaining a concept when the present approach has failed.	( )
( )	39.	Determine when my present approach of explaining a concept has failed.	( )
( )	40.	Recognize three strategies being used by my students to "fake out" teachers.	( )
( )	41.	Use a Flanders Interaction Analysis scheme to determine whether my class is teacher dominated.	( )
( )	42.	Determine letter grades for my students' work while I have been teaching them.	( )
( )	43.	Demonstrate a procedure for finding square root that emphasizes understanding rather than following rules.	( )
( )	44.	Give an example of a generalization over the real numbers.	( )
( )	45.	Teach a generalization using either an expository or a heuristic strategy.	( )
( )	46.	Conduct a conference with an irate parent of one of my failing students.	( )
( )	47.	Locate materials for a mathematics bulletin board display.	( )
( )	48.	Give students assistance in improving their study habits.	( )
( )	49.	Devise a laboratory activity for introducing factoring of algebraic expressions.	( )
( )	50.	Plan a lesson for a general mathematics class which involves the use of a desk calculator.	( )

Now that you have finished, please read the following instructions. The above abilities vary in their importance to mathematics teachers. Kindly give your estimate of the importance of each ability by assigning a rank of from (1) entirely unimportant to (5) extremely important. Go back to the beginning, reread each item, and place your ranking in the right-hand column. THANK YOU.